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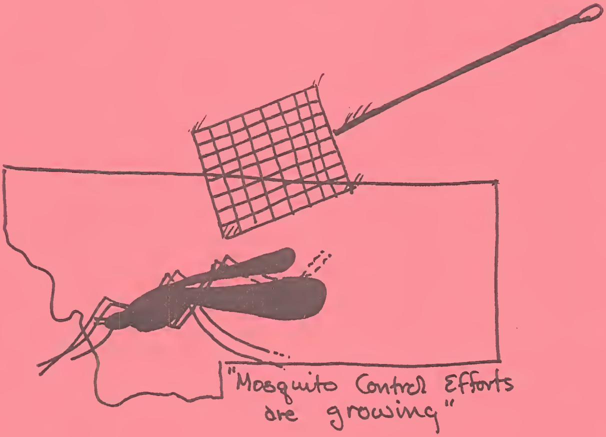

"Mosquito Control Efforts are growing"

MONTANA DEPARTMENT OF HEALTH &
ENVIRONMENTAL SCIENCES
ENVIRONMENTAL SCIENCES DIVISION
FOOD & CONSUMER SAFETY BUREAU
HELENA, MONTANA

VECTOR CONTROL SECTION

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This newsletter by the Vector Control Section, Food & Consumer Safety Bureau, is to inform concerned colleagues of the efforts in our profession, vector control. In this light, vectors are insects and rodents which may adversely affect the public health and well-being by directly or indirectly transporting or transmitting a disease causing agent, or which may cause other health trauma.

Randall F. Moy

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EDITORS NOTES

This newsletter is our second effort to stimulate interest in vector related problems. It is my hope that our efforts will help coordinate and contribute to Montana's mosquito control efforts through the dissemination of valuable information, in addition to addressing particular questions that you may want answered. At the same time, this letter can express your views on specific problems or modes of operation that you believe other mosquito control efforts in this state should be aware of.

If after reading this newsletter you feel strongly about a certain issue, please write us and let us know your opinions. If your views differ, we will be happy to share your viewpoint with our readers.

Shortly, the state mosquito control efforts will be in full force as mosquito larvae were reported throughout the state the third week of April, which kicked off their annual infestation and annoyances. The spring storm of late April only complicated the situation. Preliminary observations indicate that Montanans will again be severely plagued by mosquitoes this summer.

Let us not forget the importance of integrated controls. Strict dependency upon chemical insecticides has started to receive a bad flavor from many ranchers and others who are advocating integrated controls. The general public likes to hear that, in part, our efforts involved biological controls, in other words, allowing nature to take care of nature. I foresee that biological controls and the growth regulators will play a greater role in Montana's mosquito control efforts in the future. Primarily because the public has acquired an environmental awareness or conscienceness precipitated by the environmental movement in this country. But for the time, chemical insecticide applications far outweigh, if any, detrimental complications.

Let us all remember that the art of insect control is becoming more complicated with greater technology advancing the scope of control techniques. As time passes, we who are responsible for the mosquito control programs must be responsive to the conscienceness of the people in Montana and must stay abreast with the most beneficial controls. We are striving for sound environment today, that we can work and play in without being annoyed by insects. But, we are also very concerned for the environment of our children's children, to absolutely insure that it does not become contaminated by diseases and annoyance which can no longer be effectively controlled.

Randall F. Moy
Environmental Biologist
Food & Consumer Safety Bureau

NEWSY ITEMS

1. On the 21st of April, approximately 400 Gambusia affinis, the mosquitofish, were trapped at Nimrod, Montana, 12 miles west of Drummond, transported and planted into a small pond at the south end of Canyon Ferry Reservoir controlled by Montana State Fish and Game Department. Additionally, the Fish and Game Department has granted approval for planting of Gambusia north of Fort Shaw, at the American Smelter and Refinery Company recycling pond and at an oxidation lagoon located at Alhambra. As other suitable sites are located, permission for planting of these sites will be requested through the Department of Fish and Game.

2. The Fairfax Biological Laboratory of Clinton Corners, New York, stated that the Merimithid nematode, Reesimermis nielseni, commercially known as Skeeter Doom will be available June 1 for experimental application. When the prices are released on Skeeter Doom, they will be published in the next newsletter. Skeeter Doom is an effective larvicide for over 60 species of mosquito larvae. This office has proposed two experimental applications of Skeeter Doom for evaluation this summer. Results of this summer's efforts will be released this fall. Hopefully, Skeeter Doom will be available next summer to mosquito abatement districts for greater dissemination.

3. The last legislature charged the State Commission for Local Government to evaluate, rewrite and recodify laws and regulations for the local (county) governments. Recently, this office was informed that a draft of the proposal will be available for review and comments in the near future. We are aware that the intended proposal does affect the operations and formation of mosquito control districts. Therefore, we feel that it is imperative that interested parties review and comment on the proposed draft; so, please let us know if you desire to do so in order that we can send you a copy.

4. The following individuals were appointed at the State Mosquito Abatement Advisory Council and who are serving at the pleasure of the Governor are:

B. J. "Swede" Goodheart, Box 1013, Malta, MT 59538

Dr. Richard Weber, Ft. Peck Rte., Glasgow, MT 59230

Roger Sprinkle, 423 Indiana, Chinook, MT 59523

James Freeman, 521 1st Ave. NW, Great Falls, MT 59404

Ray Fisher, 250 Valley View Drive, Kalispell, MT 59901

George Lackman, MT Department of Agriculture, Helena, MT 59601

Senator Donald R. Foster, 111 East, Lewistown, MT 59457

Thomas L. Lippert, Box T, Hardin, MT 59034

Wes Woodgerd, Department of Fish & Game, Helena, MT 59601

These individuals have invested a keen interest in providing a sound environment - free of the mosquito nuisance, and in their respective areas, are available for comment. They are extremely receptive to any ideas or criticisms that the people of Montana want to express in regards to mosquito or insect control. Remember, this council represents you the people and can only serve you - if they are knowledgeable of your feelings.

5. The State Mosquito Abatement Advisory Council is extremely interested in working toward the correction of improperly drained ditches, borrow pits, sloughs, etc. along existing roadways. To adequately work this problem, they request that if anyone identifies a potential mosquito breeding source of the aforementioned that they would please describe the source (e.g. slough, borrow pit), its location (e.g. 10 miles from south of Townsend on HY 287) and, if possible, take a picture of breeding site and forward this information to this office for presentation to the Montana State Highway Department for their corrective - planning action. This state has thousands of highway miles, so to do this program of identifying mosquito breeding sources along highways any justice, we must solicit your help in their identification.

6. If any of our readers observe what they determine to be a flagrant violation of improper irrigation techniques, in other words, water standing on irrigated fields for an extensive-prolonged period, we would appreciate the location and description of condition so we could better evaluate the magnitude of this problem.

7. Our eastern neighboring state, North Dakota, experienced 53 human cases of encephalitis last summer which resulted in four deaths. This problem is so real and so close to home.

8. If your community experiences a mosquito problem this summer and the citizens desire relief from the nuisance, our office will assist you in making arrangements to remedy the situation.

9. We welcome the newly created Columbus, Anaconda West Valley, and Lewis and Clark County Mosquito Abatement Districts and praise the efforts of Hill County and Deer Lodge in their efforts to form a district.

10. To evaluate the intensity of your mosquito problem this summer and to determine when insecticide application is warranted, the standard New Jersey Mosquito Light Trap can be purchased at a reasonable price from either Concession Supply Company, 3916 Secor Road, Box 8633, Toledo, Ohio 43623, Phone #419-473-1495 or from Hausherr's Machine Works, Old Freehold Road, Toms Drive, New Jersey 08753, Phone #201-349-1319. The various models available and the price listings can be obtained by contacting this office.

11. H. R. 12376 Bill, was introduced to the House of Representatives, 94th Congress on March 9, 1976, which "provides for the control of mosquitoes and mosquito vectors of human disease through technical assistance and grants-in-aid for control projects", also known as the "Mosquito Control Act of 1976"; and which was referred to the Committee on Interstate and Foreign Commerce. This bill provides for grants-in-aid funds to states and approved local mosquito control programs on a fifty-fifty matching basis. This would greatly enhance

the mosquito efforts of this state. Please write your Congressmen if you are in support of this bill. A copy of the bill can be provided upon request by this office.

12. Minutes of past Montana State Advisory Council Meetings are available upon request.

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MONTANA, HOW'S YOUR MOSQUITO PROBLEM!

by

Randall F. Moy

A questionnaire was sent to all counties and those communities with a population over 500 requesting information concerning the mosquito problem in their vicinity and their control effort. For those areas without controls, we were interested if they desired to establish one. Additionally, the questionnaire addressed the financial history of existing mosquito control efforts. The results were:

a. Those communities indicating that they had a limited or non-existent mosquito problem were: Missoula, Belgrade, Stanford, Whitefish, Billings, Bozeman, Chester, Nashua, Red Lodge and Circle (although Circle indicated that they do not have a mosquito problem, they would be interested in learning about establishing a mosquito abatement district).

b. Those communities indicating that their mosquito problem was moderated but were not interested in establishing a mosquito abatement district were: Philipsburg, Browning, Fairfield and Hamilton.

c. Those communities indicating that they had a severe or moderate mosquito problem and were interested in forming a mosquito control district were: Belt, Troy, Lewistown, Libby, Cascade, Fairview, Helena, Columbia Falls, Anaconda, and West Yellowstone.

d. Those communities indicating that they had a severe mosquito problem but were presently included in an existing mosquito abatement district were: Whitehall, White Sulphur Springs and Chinook.

Although it is apparent that some areas of the state are not plagued with a mosquito problem, other areas are badly infested with mosquitoes. For those with the severe and moderate mosquito problem interested in forming a mosquito abatement district, you will find the article entitled, "How to Form a Mosquito District" of great interest. This article is only a preview to inform interested parties the steps required to form a mosquito abatement district. We will provide clarification, counciling and other information as required during your attempts to form a mosquito abatement district.

The financial data was extracted, extrapolated and tabulated from the questionnaires and from budgetary information in our files.

The chart following this article illustrates the budgetary growth and the formation of new mosquito effort in the past five years. Although this information was requested by the questionnaire and required by annual report, some of the data is quite sketchy and could be in error.

The mosquito control budget for FY 1976 will be approximately $400,000 which reflects the tremendous budgetary growth of existing and the formation of new mosquito control efforts. We anticipate that this rate will grow at a steady 12 percent per year for the next decade.

In relationship to Oregon, Washington and Idaho, our northwestern sister states, Montana placed third in total support per annum for vector control programs, although you will note that Montana has more programs than the other states with less money devoted to each program.

State	No. of Programs	Total Support For Annum
Oregon	20	1,050,000
Washington	9	435,000
Montana	26	356,000
Idaho	5	100,000

For California, the picture is grossly different. California spent $12,925,425 for 1975 to control 35,470 acres inhabited with 14,987,251 people. Each Californian in a mosquito program pays 86¢ for abatement efforts while Montanans pay $2.01/person.

To better analyze the budgetary growth of mosquito control efforts in the state, we request that you provide this office with figures to update and to maintain our records current.

		MILL LEVEL/BUDGETED			1975 acres	
Community/area/district	pop.	1971	1973	1975	Larvicided	Adulticided
Big Horn Co MCD (Hardin)	2,733	--	--	$11,000	75	700
Boulder	1,200	--	--	$5,500	--	City limits
Boulder Valley	--	--	--	$2,000	--	--
Cascade Co MAD	85,000	1.24/$101,426	1.24/$112,262	1.36/$154,853	11,700	107.55
Columbus (Stillwater MAD-newly formed	1,400	--	--	--	--	City limits
Conrad	2,270	--	*	$6,000	--	--
Deer Lodge	4,248	$865	$633	$488	100	100
Denton	400	--	$1,352	--	--	--
Fort Benton	1,863	--	*	$2,200	--	--
Glasgow Co MAD	5,000	5/$14,000	4/$20,000	5/$20,000	3,200	4,000
Glendive	6,305	$2,000	$600	$600	--	1,885
Jefferson Co MAD	2,500	*	5/$10,500	5/$17,500	*	*
Kalispell-Flathead (MAD #1)	10,500	.61/$17,737	.6/$18,690	.93/$19,425	1,100	9,000
Lewis & Clark Co MAD	9,000	--	--	$15,400	--	--
Livingston	10,000	--	--	1.3/$10,050	125	1,500
Malta	2,500	1.96/$3,600	2.25/$5,000	1.54/$9,000	--	675
Malta-Phillips MAD	3,150	3.87/$14,550	3.85/$16,550	3.85/$19,950	325	790
Miles City AD (Custer Co MAD)	12,000	.5/$6,000	.5/$6,000	.75/$8,000	--	600
Milk River MCD (Blaine Co)	3,300	.5/$20,000	.5/$13,500	.5/$22,710	1,785	7,000
Shelby-Toole MAD	4,500	$4,786	2.15/$8,126	$7,828	320	3,000
Somers-Flathead Co MAD	889	--	--	$2,455	--	2 mile radius of city limit
Sunburst MCD	604	*	.5/$1,544	*	*	*
Terry	870	$700	$800	$1,800	--	480
Townsend/Broadwater MAD	1,871	3/$4,500	2/$3,000	5/$9,600	--	1,500
Whitehall	1,035	--	*	$8,000	--	--
White Sulphur Springs MAD/ Meagher Co	1,200	*	.84/$958	$1,500	*	*
Wolf Point	3,095	*	.18/$1,200	*	*	*
Total	177,044	$190,165	$220,715	$355,819		

* Not available

STEPS IN ORGANIZING A MOSQUITO CONTROL DISTRICT - A LOCAL OPTION

by

Kenneth L. Quickenden, Ph.D., R.S.

These steps required to form a district are relatively simple and sequential, but do require a great deal of persistence and dedication by the interested parties to carry their efforts to conclusion.

1. First, contact the Vector Control Section, Food & Consumer Safety Bureau, Department of Health & Environmental Sciences at 449-2408 or 2409 and secure:
   a. Copies of current laws governing mosquito control district formation (Read & understand the law - Legal slip-ups have occurred in the past).
   b. Draft news releases illustrating (1) the effects of mosquitoes on health, recreation and economy, (2) causes of mosquito problems, (3) organizational approaches and (4) methods used to control mosquitoes. This material is useful in obtaining a better understanding of mosquito control and to sell your proposed program to others.

2. Visit your county sanitarian (local health department) to see if he/she may be of assistance.

3. Call a community meeting to help determine interest and clear up questions and concerns related to 1 a and b above. The Department of Health and Environmental Sciences would be happy to present a slide series and assist in getting you started.

4. Determine boundaries for a district. This depends on:
   a. A survey - the type, extent, locations and significance of mosquito rearing/production sources. (See Note 1).
   b. The interest of people in the proposed area, particularly those near the periphery which could be included in a district (i.e. normally those inhabitants two or three miles outside of significant mosquito sources).
   c. The adequacy of description terms for registered voters and taxpayers. Check with the county Clerk and Recorder to see if he or she could draw up an adequate list of registered voters or taxpayers from descriptive terms used. It does not make sense to include excess dry land areas or areas not affected by mosquitoes - only opposition will be gained.

5. Describe the tentative area to be included in a district. Sample petitions may be used as a guide. Ask the county attorney to assist with drawing up a legal petition description of the area to be included.

6. Ask the county Clerk and Recorder to determine how many registered voters reside in the area in order to determine

how many signatures are needed to secure a 25% petition. Ask him (her) to describe the form that signatures should have, e.g. as on voter registration list. You will want legal signatures.

7. Ask the county assessor/clerk to begin drawing up a list of nonresident property owners/taxpayers (he/she may not be able to supply a complete list for nonresident personal property owners). The law requires that nonresident property owners receive written notice of intent - to form a district if their addresses are known.

8. If it appears possible to get the required number of signatures, pass petitions simultaneously with a public information/public relations effort. An organized group such as a Lion's Club, Jaycees or Chamber of Commerce gets things done; crusaders seldom do. Therefore, it is suggested that assistance in passing petitions be secured. A group should have a semiformal organization, e.g. chairman, biological or district boundary committee, publicity committee, petition/legal committee, mailing committee, etc. (See also: Note 2).

9. If it appears that the required number of signatures will be secured, proponents of a district must secure funds for mailing, posting and publication. (Solicitation of donations has been used in some areas.)

Note 1. District Boundary Determination/Survey: Some communities have merely taken general note of locations of breeding areas and included those within two or three miles of a group of people within a proposed district. In this situation, a detailed survey is accomplished during the first year or two of district operations. Other communities have had a detailed survey conducted at this point. (This is a slower approach but has the advantages of ensuring that all areas which should be included, are included; excess area is not; cost estimates can be determined; and, approaches that could be used can be more clearly determined.) Surveys have either been conducted by volunteer organizations trained by the Department of Health or by contract (using, perhaps, revenue sharing money). County sanitarian(s) have either overseen such work contracted to a private organization or (on occasion) have used revenue sharing money to temporarily hire someone to do the survey.

Note 2. Persons passing petitions should be able to explain:

a. Benefits and reasons for district formation - personal explanations are needed as well as news releases. Public support must be gained.

b. Options and approaches taken -- types of control - physical, biological, chemical
  -- methods of expanded resources to hold costs down
  -- cooperative efforts that are possible

c. Expected cost to persons - i.e. how to figure mill levy, maximum possible mill levy is five, personal and real property taxed.

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PUBLIC AWARENESS
AN IMPORTANT STEP TOWARDS SUCCESS

by

Jim Freeman[1]

Public awareness is of the utmost importance in the effective operation of any mosquito control program. Public support is obviously needed for initial district formation but this is just the beginning of the important role that the public plays in a viable mosquito control program. A well-informed public is the strongest advocate of a sound pest management program. An uninformed or a misinformed public equally can be a strong adversary. Only through an active community awareness campaign can we insure ourselves of a well-informed and interested public.

To develop an informed public means - working through local news media to disseminate information on a regular basis concerning various aspects of your district operation. Periodic articles in one's local newspaper go a long way toward getting accurate information to the public and to expose serious problem areas of particular concern. Television news time might be available and should be investigated. Local radio stations are another media that should not be overlooked.

You need to let the public know: your mode of operation, key personnel to contact if questions or problems arise, areas to be controlled during the upcoming week, where the mosquito concentrations are the greatest in order for the public to avoid these areas, the effects of the chemicals you are using to include an explanation of the nonexistent or slight secondary affects. It is well to remember that an informed public will be responsive to your needs.

Another means of disseminating mosquito control information would be by the development of short informational slide presentations accompanied by a cassette or a written script for distribution to school systems within your district. The same presentation could also be made available to local service clubs and the various boy's and girl's clubs in your area. These presentations could be developed locally or the districts might be able to obtain ready-made presentations from other sources like state or federal agencies or from the chemical companies. These presentations should cover safety, labelling, licensing, records, calibration, application techniques, demonstration of the equipment use in controlling, illustration of primary mosquito habitats and how they are controlled.

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[1] Technical Services Director for the Cascade County Consolidated Pesticide Program and Chairman of the State Mosquito Abatement Advisory Council for the CY 1976.

You should try stimulating your local vocational-agricultural instructors to develop projects concerning sound farming practices to demonstrate good mosquito source reduction and proper irrigation techniques. Safe and environmentally sound application of agricultural chemicals should be thoroughly stressed. Additionally, try and hire vo-ag students for the summer mosquito control efforts in order that they may obtain firsthand experience and knowledge.

Lastly, I suggest the development of a project manual in cooperation with 4-H, whereby, various mosquito control operations could be undertaken by 4-H'ers as sanctioned 4-H projects and possibly sponsored by the State Mosquito and Vector Control Association. As an additional incentive, the Association could offer cash awards for achievement on a competitive basis to individuals and club project winners.

I feel that as many of the above suggestions as practical should be undertaken by each mosquito control organization. Let's always remember that a well-informed public is the strongest stimulus behind any smoothly functioning mosquito control district.

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GREATER UTILIZATION OF INDIGENOUS FISH SPECIES FOR THE CONTROL OF MOSQUITO LARVAE

by

Randall F. Moy

An integral part of any mosquito abatement district's efforts to control mosquito larvae should be maximum utilization of native or indigenous fish species. In this state, we have a couple of good candidates that can serve our efforts with greater dissemination. A well established fact is that in bodies of water inhabited by minnows or game fish that can penetrate vegetation and survive shallow depths, normally the mosquito populations are very minimal. Therefore, it would behoove every individual concerned in controlling mosquitoes to strive for greater control by using these native species rather than greater dependency upon chemical insecticides. Presently, in this state there are many permanent bodies of water whether they be borrow pits, small ponds or lakes, sloughs, etc. that are suitable for a particular species of fish that could serve as a control equal to its chemical counterpart. The Montana State Fish and Game strongly recommends expanded utilization of indigenous fishes other than exotic fishes or other biological controls when and where they are the most suitable candidate to control the mosquito larvae infestation. The Fishery Division of the Montana State Fish and Game has offered limited assistance in trapping and transplanting indigenous fish into suitable sites. This office will act as the prime coordinator to insure that each site has been properly identified, evaluated for the best fish species with the assistance of the Fish and Game, and will contact the individuals of that area to help administer the transplant. Written approval for each transplant site is mandated by state law and charged to the Department of Fish and Game.

The primary impetus of this program lies in the identification of suitable sites for transplant. It would be impractical to expect individuals unfamiliar with the countryside to attempt to locate suitable sites. Therefore, I solicit the help of persons associated with mosquito abatement efforts to identify these sites based upon a past history of mosquito production. Next, this information must be passed on to this office so that we can get the ball rolling. After transplanting a native fish, some monitoring or surveillance will be required. The primary burden for monitoring will lie with this office, the Fish and Game and local mosquito abatement districts. But again, we solicit volunteers to help in this endeavor and would be happy to educate anyone in the required sampling procedures. It is both interesting and enjoyable to do.

Possible indigenous fish candidates are: the fathead minnow, the _Pimephales promelas_; Brooks stickleback, _Culaea inconstans_. Other likely candidates would include: the yellow perch, _Perca flavescens_; large-mouth bass, _Micropterus salmoidis_; the golden shiner, _Notemigonus crysoleucas_; flathead chub, _Hybopsis gracilis_. Maybe the answer lies in a synergistic effect, whereby, a game fish, i.e. the large-mouth bass, would be planted with a native minnow like the fathead, which would create a fishing spot for the enthusiastic angler free of mosquitoes.

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THE 'STATE OF AFFAIRS' OF BIOLOGICAL CONTROLS

by

Randall F. Moy

Biological agents for the control of mosquito larvae have been investigated for years. During this time, many agents have proved their merit as a control while others have slowly evaporated from the literature as their worth proved unfounded. First, let us 'lay to rest' those agents conjured to have behaved as biological controls.

Probably the most noteworthy and publicized agent was the purple martin, a bird of unreputed reputation for taking mosquitoes. This answer to the mosquito problem soon proved to be a well developed hoax. The purple martin's habitat was found to be prominently near bodies of water in wilderness, quite a distance from the populated areas. Researchers studying this supposedly remarkable bird soon surmised that the purple martin flies during daylight hours and not during the early mornings and late evenings when the mosquitoes take flight. After several hundred of these birds were dissected, not one mosquito larvae could be found in their digestive tracts. Therefore, the only person who benefitted from the hoax was the catalog house that advertised and sold purple martin houses.

The dragonflies in both the adult and larvae stage have long been known to consume mosquito larvae. However, this insect has not been considered seriously as a biological control for several reasons: Immature dragonflies do not possess the searching capacity and tenacity required of a biological control agent, mass production techniques for dragonfly larvae have never been adequately developed and, to coincide the presence of dragonfly larvae in a water site and the adults nearby when the mosquito larvae and adults are abundant is difficult. An insect belonging to the order Hemiptera, more commonly known as the back swimmer, is quite voracious for mosquito larvae. However, the numbers required to provide adequate control of mosquito larvae would be utterly tremendous and mass rearing techniques to supply the required numbers have as of yet not been perfected. The insects that do prey upon mosquito larvae in any degree is an important contribution to natural control and is greatly appreciated. However, the primary problem that discourages concentrated research in this area lies in the large numbers of insects that would be required to serve as controls. These numbers could cause the good insect to develop into the monster.

References have been made to the possibility of utilizing a blue-green algae as a control agent. Dr. Prescott from the University of Montana has been working for some time with algae and noted that the entire question of controlling mosquitoes by various algae is still quite up 'in the air'. He relates that the basic problems are twofold. First, the kind of algae which are known to be active producers of toxic substances are highly objectable to water habitats; and secondly, the kind of algae which are known to produce antibiotics in sufficient quantities to be useful in control will not grow in waters where mosquitoes normally breed. Also, he remarked that the published research in this area has been quite scanty, but that the possibility of this type of control cannot be totally eliminated without further research and a better correlation of past results.

The best control of the mosquito problem lies with an integrated control, whereby, both chemical insecticides and biological agents are combined in hopes of greater dependency upon the latter. First, wherever possible, indigenous fish species native to the state needs to be investigated and those which have the following characteristics need to be studied: good distribution within the state, small-minnowlike, surface feeders, outstanding propagation rates, hardiness and readily available. The dangers associated with the introduction of exotic fish species could possibly parallel the results caused by the English sparrow, the starling and the grass carp. Therefore, exotic species require extensive preliminary study and screening before introduction. This screening process is also applicable to all new biological controls being conceived, i.e. viruses, bacteria, fungal pathogens, etc.

The fathead minnow, Pimethales promelas, presently appears to be the most suitable candidate of the native fishes. Dr. Gould of the Montana Cooperative Fisheries Research Unit advocates further distribution of this species for mosquito control. The fathead minnow has the outstanding ability for taking great numbers of mosquito larvae as published by Dr. Brust, University of Manitoba. Although the credentials of the fathead minnow are good, other fish species still need to be examined, like the Brooks stickleback, flathead chub, golden shiner, yellow perch and large-mouth bass as covered in the article entitled, "Greater Utilization of Indigenous Fish Species for Control of Mosquito Larvae" found in this newsletter.

After efforts are made toward greater utilization of the indigenous fishes, our attention will be focused on greater dissemination of the mosquitofish, Gambusia affinis, (in strategically located areas). An excellent source of these fish is from Nimrod, Montana. Here, they are present in sufficient numbers to easily supply the numbers required to transplant numerous warm water sites throughout the state. Preliminary results indicate that Gambusia can be planted in the contaminated recycle discharge pond like the one that is located at the American Smelter and Refining Company at East Helena. Apparently, the warm water containing relatively high levels of various metals including iron and arsenic shows no harmful effect on the mosquitofish. Likewise, an oxidation pond at the Hillbrook Nursing Home located at Alhambra, Montana, appears to be a suitable overwintering habitat for Gambusia. Relatively warm water springs that have been located near Great Falls and Toston, Montana, appear ideal for propagating/rearing ponds and after preliminary data is gathered on the aquatic flora and fauna, these experimental plots will be planted; of course, with prior approval from the Montana Fish and Game.

Flatworms and planaria belonging to the class Turbellaria are presently being extensively tested in the field as possible control agents. Dr. McDaniel's flatworm, Mesostoma macroprostatum, appears to be more suitable to the harsh environment found in Montana than Dugesia dorotocephala, the planaria of Dr. Legner. Although Dr. Legner stated that if a local strain of the D. dorotocephala could be located in Montana, its chance of survival as a bio-agent would be much greater. Besides the flatworms, the roundworm has received considerable attention in the past several years. Dr. Peterson's and Dr. Nickle's Mermithid nematode, Reesimermis nielseni, will shortly (May 1) be on the market commercially and will be known as 'Skeeter Doom'. We have been in contact with Dr. Nickle and Dr. Peterson and have hope of obtaining some of these roundworms for experimental application near Great Falls and Townsend.

Both the green hydra, Chlorohydra viridissima, and the white hydra, Hydra americana, have been investigated. Presently, Dr. Sjogren of the Metropolitan Mosquito Abatement District in St. Paul, Minnesota, is involved in a three to five year research program investigating all the parameters of Chlorohydra viridissima as a suitable control.

Recent developments have spotlighted the following pathogenic organisms as controls. Various strains of both Bacillus sphaericus and Bacillus thuringiensis have received considerable attention and are presently being field tested and evaluated. From all the preliminary information reviewed, bacteria, in the very near future, will play a tremendous role in mosquito control. Various fungal pathogens in three to four years will be integrated into mosquito control. Species like Coelomomyces spp, Lagenidium giganteum, Beauveria tenella and Matarrhizium anisopliae have recently demonstrated their excellent capability to control mosquito larvae. However, more field trials and refinement of mass rearing techniques are still indicated. In the distant future, protozoans like Nosema algeria (microsporidum) and the viruses will find themselves as an integral part of biological controls. Presently, the volume of literature currently being published on bacteria, fungus, protozoans and viruses is tremendous and the leading experts in this discipline strongly feel that they are very effective against mosquitoes with little or no affects on the non-target organisms.

Host specificity is crucial for any biological control and in this area we are concerned for all proposed biological control agents. Of immediate concern is the possible but yet unsubstantiated by research that _Gambusia affinis_ could directly affect the aquatic ecosystem causing an imbalance, greater than that found in habitats inhabited by indigenous fish species. Hopefully, the results of the experiments outlined for the summer will infer that both _Gambusia_ and the indigenous fish species, like the fathead minnow, will not cause adverse secondary effects and that both can show promise as a good control agent.

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LET'S GET INVOLVED

by

Doug Johnson[1]

An active association is dependent upon an active membership. Effective action is dependent upon communication and communication is our responsibility. With these thoughts in mind, there are certain items that need to be considered by the members at this time to facilitate planning for upcoming Montana Mosquito & Vector Control Association Meetings. Plans are now being formulated for the annual fall meeting and we need your input to plan a meeting that will benefit both the members and the association. Several members attending last years meeting have indicated that they obtained valuable information that led towards their procurement of surplus government property for their district, i.e. vehicles, etc. Previously, they were unaware of this source of materials and equipment. Therefore, we have hopes of providing this type of information again at this upcoming session.

Presently, several areas in the state are considering the formation of new districts. I feel that it is in the best interests of our association to assist these areas in any manner possible. Therefore, I solicit comments from individuals of these areas as to what their needs are and how we, the association, can be of assistance.

After reading Mr. Freeman's article on public awareness, please comment on his suggestion concerning the development of a cooperative 4-H program. I feel that public relations is an integral part of our profession and would like to discuss public relations as well as other ideas at the fall association business meeting, but your comments are needed to fully develop these ideas.

I would like to take this opportunity to thank everyone for the vote of confidence you gave me by electing me President of the Montana Mosquito & Vector Control Association. I will do my best to fulfill the duties of this office but I need your cooperation and assistance to help define the direction and goals of the association.

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[1] Administrator, Cascade County Consolidated Pesticide Program and President of the Montana Mosquito and Vector Control Association

You can all help me finalize the plans for this meeting by filling out the attached questionnaire and returning it to me as soon as possible. Please include any other questions, problems or comments you might have and send your reply to:

Cascade County Pesticide Program
521 First Avenue N.W.
Great Falls, MT 59404

ATTN: Doug Johnson

QUESTIONNAIRE

1. What is your preference for a meeting location in 1976? ______________________

2. What date should the association meeting be held? ___________________________

3. Would you prefer:

    a. 1 day meeting with a luncheon ____________________

    b. 2 day meeting with a banquet _____________________

    c. 2 day meeting with a luncheon and banquet _________

    d. Other (specify) _________________________________

4. What type of speakers and what type of information would you like to see at the meeting? ____

5. How can this association be of further assistance to you or your district?

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